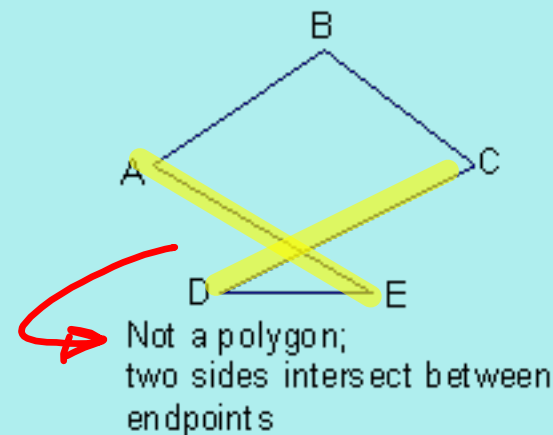
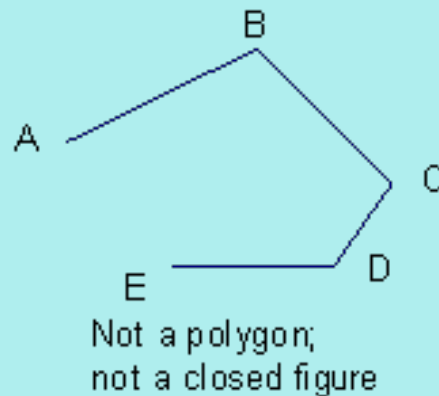
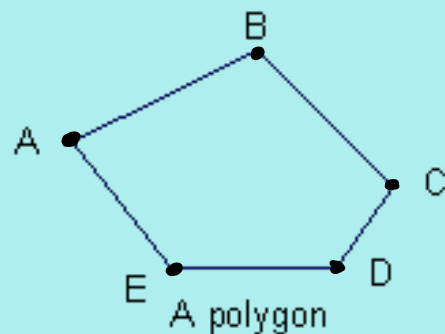


Geometry

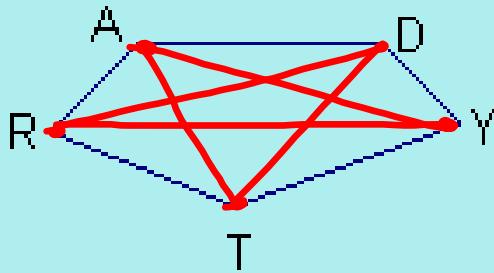
Ch. 3 Handout 3.5

The Polygon Angle-Sum Theorem

A **polygon** is a closed plane figure with at least three sides that are segments. The sides intersect only at their endpoints and no two adjacent sides are collinear



Convex polygon

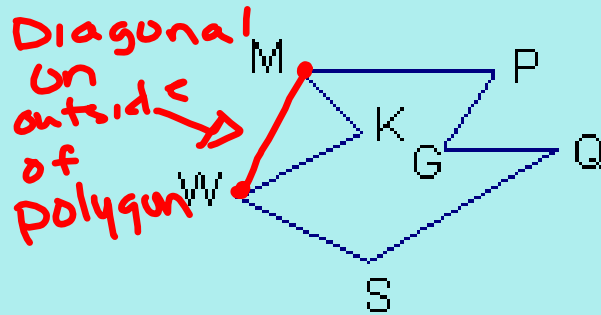


A Convex polygon

Pull

does not have diagonal points outside of the polygon.

Concave polygon



A Concave polygon

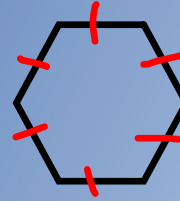
Pull

has at least one diagonal with points outside of the polygon.

An Equilateral polygon

Pull

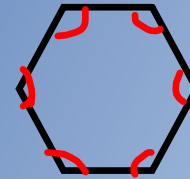
all sides are congruent.



An Equiangular polygon

Pull

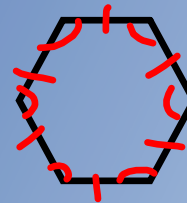
all angles are congruent



A Regular polygon

Pull

all sides and angles congruent

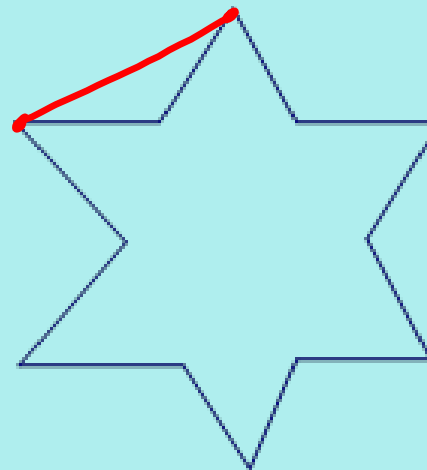


Sides	Name	Sides	Names
3	Triangle	8	Octagon
4	Quadrilateral	9	Nonagon
5	Pentagon	10	Decagon
6	Hexagon	12	Dodecagon
7	Heptagon	n	 n-gon

1. Classify the polygon at the right by its sides. Identify it as convex or concave.

Dodecagon

Concave



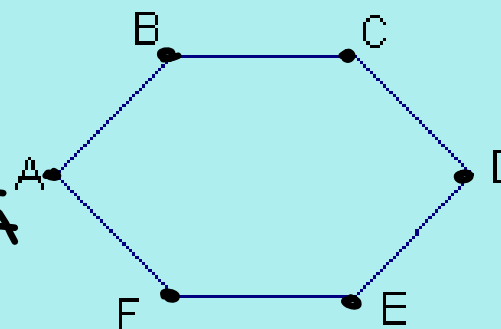
2. Name the polygon. Then identify its vertices, sides, and angles.







Hexagon

Vertices: A, B, C, D, E, F

Sides: \overline{AB} , \overline{BC} , \overline{CD} , \overline{DE} , \overline{EF} , \overline{FA}

Angles: $\angle B$, $\angle C$, $\angle D$, $\angle E$, $\angle F$, $\angle A$



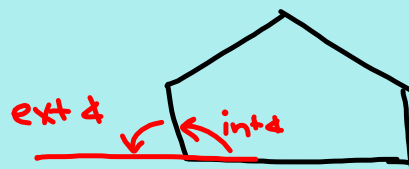
Polygon	Number of Sides		Number of Triangles Formed	Sum of the Interior Angle Measure
Triangle	3		1	180
Quadrilateral	4		2	$2(180) = 360$
Pentagon	5		3	$3(180) = 540$
Hexagon	6		4	$4(180) = 720$
Octagon	8		6	$6(180) = 1080$
Decagon	10		8	$8(180) = 1440$
N-gon	n			$180(n-2)$

*Sum of the Interior Angle Measure: $180(n-2)$

Sum of each Interior Angle Measure of a regular polygon: $\frac{\text{Sum}}{\# \text{ of sides}} = \boxed{\frac{180(n-2)}{n}}$

*Sum of the Exterior Angle Measure: 360

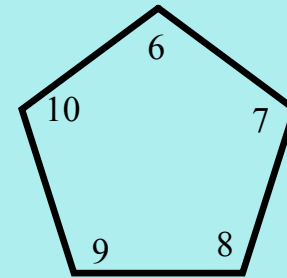
Sum of each Exterior Angle Measure of a regular polygon $\frac{\text{Sum}}{\# \text{ of sides}} = \boxed{\frac{360}{n}}$



$$m \text{ of } \angle x + \angle + m \text{ of int } \angle = 180$$

Theorem 3-14: Polygon Angle-Sum Theorem

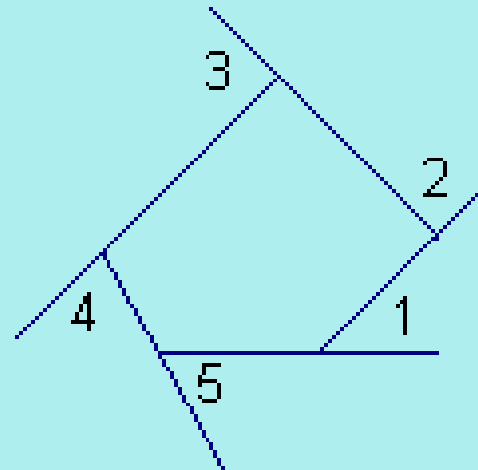
The sum of the measures of the angles of an n -gon is $(n - 2)180$.



Theorem 3-15: Polygon Exterior Angle-Sum Theorem

The sum of the measures of the exterior angles of a polygon one at each vertex is 360.

For the pentagon, $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5 = 360$



3. Find the sum of the measures of the angles of a decagon.

decagon: $n = 10$

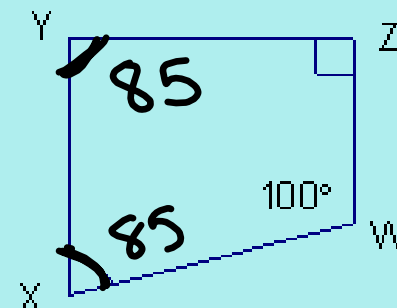
$$180(n - 2)$$

$$180(10 - 2) = 180(8) = 1440$$

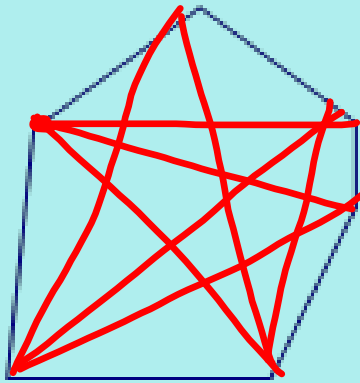
4. Find $m\angle X$ in quadrilateral XYZW.

$$\begin{array}{r} 2 \overline{) 360} \\ - 190 \\ \hline 170 \end{array}$$

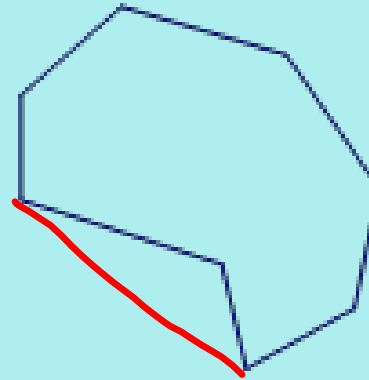
$$\begin{array}{r} 85 \\ 2 \overline{) 170} \\ - 16 \\ \hline 10 \end{array}$$



5. Classify each polygon by its sides. Identify each as convex or concave.



Hexagon^o ; Convex

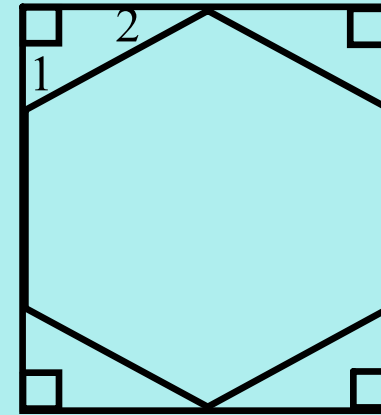


Octagon ; ConCave

6. a) Find the sum of the measures of the angles of a 13-gon.
- b) The sum of the measures of the angles of a given polygon is 720. How can you use the sum $=(n - 2)180$ to find the number of sides in the polygon?

7. Pentagon ABCDE has 5 congruent angles.
Find the measure of each angle.

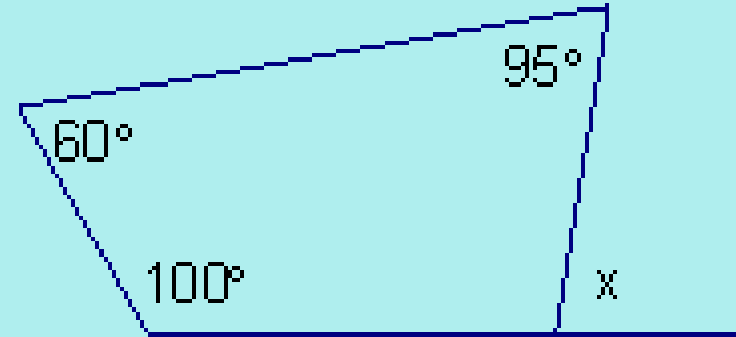
8. a) In the figure at the right, find the $m\angle 1$ in a regular hexagon by using the Polygon Exterior Angle-Sum



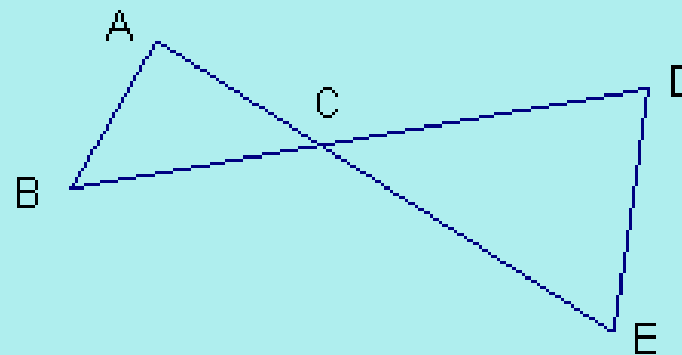
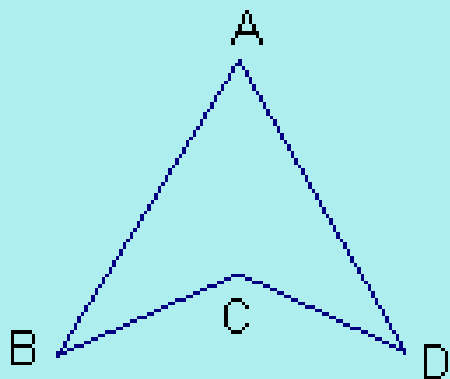
b) Find $m\angle 2$.

Is $\angle 2$ an exterior angle? Explain.

9. Find $m\angle X$ in quadrilateral XYZW.



10. If the figure is a polygon, name it by its vertices. If the figure is not a polygon, explain why not.



11. A pentagon has two right angles, a 100° angle, and a 120° angle. What is the measure of its fifth angle?

Find the measures of an interior angle and an exterior angle of each regular polygon.

a) decagon

b) 15-sided polygon

Assignment:

Day 1: pgs 161-164 1-15



